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Daniel Cady Eaton,

1834–1895.

By William Albert Setchell.

(With portrait.)

The death of Prof. Daniel C. Eaton, at his home, in New Haven, on June 30, 1895, removes from among us the last link intimately connecting the systematic botany of the present with that of the past. During the first half of the present century the most influential writer upon, and teacher of, botany in this country was Amos Eaton, Senior Professor of the Rennselaer Institute at Troy, N. Y., and grandfather of the subject of our sketch. His Manual was the inspiration and guide of our earlier botanists, and continued to be until supplanted by the works of Torrey and Gray. The botanists earlier than and contemporaneous with Amos Eaton were writers of Floras, but Amos Eaton, himself, was a teacher of great ability and awakened, even among the members of the New York Legislature, so it is said, a deep and widespread interest in natural history. From him John Torrey learned the rudiments of botany, and was able to broaden and deepen the knowledge and interest in botanical things of Asa Gray, whose first knowledge of the subject came from Amos Eaton's text-books. Of Gray's influence upon the botany, not only of this country, but of the world, it is needless to speak, so present is it with all of us. Of Gray's associates and pupils two were more intimately thrown together than any others, and these

were Daniel C. Eaton and Sereno Watson. With them we may say, perhaps, that the direct line of succession ends. Others there are, no less illustrious, but they have departed more widely than these two from the direct line of work, and the mantle, while it has fallen upon most worthy shoulders, yet lacks the accumulated traditions which were a precious heritage in themselves.

Daniel C. Eaton, as he was called to distinguish him from his cousin, D. Cady Eaton, was the son of Amos B. Eaton and Elizabeth Selden, and was born at Fort Gratiot, Mich., on February 12, 1834. His father was an officer in the Regular Army of the United States, had served with distinction in the Seminole and Mexican Wars, had risen to the office of Brigadier General, and was entrusted with the very important work of supervising the Commissary Department as Quartermaster General during the Civil War. Although he never had any special scientific education, as had a sister and a brother who became teachers in these lines, yet he possessed a keen interest in natural history and helped to direct his son's education whenever the roving life of an army officer allowed him to do so. Mrs. General Eaton was a sister of Samuel K. and Henry R. Sheldon, two distinguished jurists of Rochester, N. Y.

Daniel C. Eaton's early training was obtained in different places. For a time the family resided in New York City, and during the Mexican War the mother and children remained at Rochester. Later he attended the Rennselaer Institute for a short time and General Russell's Military School in New Haven, while preparing for college. His final preparation was made with a private tutor, and he entered Yale in the autumn of 1853.

During his college course he distinguished himself particularly in Latin, and he retained during the rest of his life an especial fondness for this language and its literature. But his chief interest lay in botanical pursuits, and this distinguishing trait is a prominent feature in the recollections of his classmates with whom he was a great favorite. He never had a doubt as to his future vocation, and his ambition was to become the professor of his favorite subject in his alma mater, the institution where his grandfather had received a part of his own botanical and chemical education under Professors Silliman and Ives.

During his undergraduate days he derived much pleasure and profit from his correspondence with Torrey, Gray and Sullivant, to whom he sent his specimens and to whom he applied for counsel. His herbarum still contains many of these specimens with notes from these distinguished authorities. Such was his advancement even then that in his junior year he published a short paper in "Silliman's Journal" on three new ferns from California, his first contribution to science upon a group to which he devoted later his chief attention.

He obtained the degree of B. A. from Yale College in 1857, and spent the three succeeding years in the Lawrence Scientific School of Harvard University in special botanical studies, under the direction of Professor Asa Gray. He devoted himself particularly to the study of the ferns and produced several papers. He enumerated and described the new species of ferns from the collections made by Charles Wright of the Rodgers Exploring Expedition in Cuba and Japan, for Torrey's Flora of the Mexican Boundary Survey and for Chapman's Flora of the Southern United States. Finally, in 1860, he presented to the faculty of Harvard University, as his thesis for the purpose of obtaining the degree of Bachelor of Science, his "Filices Wrightianae et Fendlerianae."

During the Civil War his botanical studies were interrupted and he held the position of clerk and inspector of stores in the Commissary Department of the United States Army in New York City. He, however, had an opportunity of associating more intimately with Professor Torrey and of increasing his store of botanical tradition.

After the war, in 1864, he was elected to the chair of botany in Yale College, which had been established by some of his friends, and his duties were assigned to the Sheffield Scientific School, with which he continued to be principally identified. A few years later he was appointed University Professor, and continued to give instruction in both departments until the end of his life. He took up his residence in New Haven in the fall of 1864, and in 1866 he married Caroline, daughter of Treadwell Ketcham, of New Haven. Mrs. Eaton, a son, and a daughter survive him.

Professor Eaton made two trips to Europe, one early in 1866 and another in 1887. As the later trip was taken for the benefit

of his health, he visited little and indulged in practically no botanical study. In 1866 he visited the botanists and botanical collections at Florence, at Geneva, at Paris, and in London at the British Museum and the gardens at Kew. At the latter place he spent two weeks in the careful study of ferns, working assiduously among the collections, every courtesy and every assistance being rendered him by Sir Joseph Hooker, then Director of the Royal Gardens.

He took many collecting trips, especially into New Jersey, with Gray, Canby and others, to the White Mountains of New Hampshire, and a portion of the last summer of his life was spent at Shelburne, N. H., with Professors Farlow and Penhallow in collecting the *Sphagna* of that region. During the summer of 1869 he spent a month botanizing among the mountains of Utah, as the guest of Clarence King, who was in charge of the geological surveys of the fortieth parallel.

Even in his undergraduate life his preference for the cryptogamous plants was marked, and he will be remembered chiefly for the work he did among them. His knowledge of the phaenogamous species, nevertheless, was very extensive and exact. He preferred, however, to entrust the work of publishing upon these plants to Professor Gray. His attainments in this line are shown, however, in the masterly way in which he has treated the *Compositae* of King's Expedition, and the additional material and other aid afforded by him in the preparation of the whole of the botany of that expedition is gracefully and effectively set forth in Watson's general introduction. Besides this work his published observations on the flowering plants are few, although he retained much interest in them even until the last.

His chief work from the beginning (1856) until about 1883 lay among the ferns and their immediate allies. His first several papers were devoted to enumerations of various collections of ferns and descriptions of new species. He contributed the accounts of the Vascular Cryptogams to Torrey's Botany of the United States and Mexican Boundary Survey, to Chapman's Flora of the Southern United States, to Gray's Manual of Botany of the Northern United States (both to the 5th and the 6th editions), to Gray's Field, Forest and Garden Botany, to the Botany of

King's Survey, to that of Wheeler's Survey, and to the Botany of California.

In 1873 he began a series of notices of "New or Little Known Ferns of the United States," directly leading up to his great work on "The Ferns of North Amcrica." This classic and and well-known work consists of two royal octavo volumes containing 683 pages and illustrated by 81 colored plates, after drawings by Emerton and Faxon, representing 149 species, all that were known at the time from North America north of Mexico. They were issued in 1879 and 1880, but the notes on ferns in the BULLETIN of the Torrey Botanical Club were continued actively until 1883, after which there were very few articles from his pen on this subject.

He was for many years much interested in Algæ and spent a considerable time upon them. He spent a portion of one summer with the United States Fish Commission at Noank, engaged in the study of this group. He published very little upon them, however, limiting himself to a list of Eastport Algæ, another of those collected by Edward Palmer in Florida and the Bahama Islands, and directions for mounting and preserving specimens. He was associated with Professor W. G. Farlow and Dr. C. E. Anderson in issuing the Algae Americae-Borealis Exsiccatae.

The later years of Professor Eaton's life were devoted to the study of the mosses and liverworts. His interest in these plants was well advanced even in his undergraduate days. He collected much and carried on a considerable correspondence with W. S. Sullivant in regard to the determination of his specimens. His knowledge of the New Haven Moss and Hepatic Flora was very extensive, and he contributed the account of these plants to the Catalogue of Plants growing within 30 miles of New Haven, pubpublished by the Berzelius Society of the Sheffield Scientific School in 1878. His other publications on these groups are confined to lists of Patagonian species and a few notes on new or rare species of the United States.

He spent a great deal of time in the study of the Hawaiian species, both of Mosses and Hepatics, and had almost completed the determination of the species of the various collections in his possession. He spoke to the writer only a few weeks before his

death of issuing a list with notes and descriptions of new species. His collection of Polynesian Mosses is very large and complete.

For a number of years he had been collecting and studying the various species of the genus *Sphagnum*. In 1893 he issued a list of the North American species and a prospectus of a proposed distribution, undertaken in connection with Mr. Edwin Faxon, to be called "Sphagna Boreali-Americana Exsiccata." He spent much time in collecting, preparing and determining sets, and was very particular about the excellence and homogeneity of his specimens. Many of the sets are practically ready for distribution, and it is to be hoped that these, at least, may be issued at some future time.

Professor Eaton prepared the botanical definitions for Webster's International Dictionary, and contributed many reviews of botanical books to the various periodicals. During the last four or five years he has contributed the botanical reviews to the "Nation" and to the "New York Evening Post," touching upon current botanical changes and opinions in the graceful and discerning way characteristic of him.

Professor Eaton was one of the original members of the Torrey Botanical Club, and remained an active member for a number of years. Later he became a corresponding member. He was a regular and active contributor to the BULLETIN, especially during the earlier years of its existence.

Besides his botanical interests Professor Eaton had many others. He was an enthusiastic lover of athletic sports, of archery, of baseball and football, and of fishing and hunting. He was an ardent student of anthropology and genealogy. He was a member of several genealogical societies and made a considerable study of the genealogies of the Eaton and Selden families, and published the results in several papers. He was also Governor of the Connecticut Society of the Colonial Wars for some years.

In politics Professor Eaton was a Republican until 1884, but from that time took an active part in the independent movement in Connecticut.

His interest in the classics, both of the Latin and of the Greek, was very great, and he much deplored the present lack of facility and even use of proper Latin, both in the choice of generic

and specific names and in descriptions. He strongly advocated the publication of a Latin description in the case of a new species. He was very impatient of the use of barbarisms in Latin nomenclature.

As a man, Professor Eaton was possessed of a most pleasant personality, winning the esteem and love of all who had the privilege of acquaintanceship with him. He was generous to the extreme and counted neither time nor trouble when performing any act of friendship.

As a botanist he was careful to an extraordinary degree. No work of his was ever slovenly or hastily done, and he had little sympathy with work of that kind on the part of others. His instruments were most carefully kept in order, his microscopic preparations most neatly prepared, finished and labelled, and all the results of his study compared and worked over and over again. His extraordinary severity in these matters led him to publish much less than he otherwise might well have done.

Professor Eaton was very conservative in regard to changes in scientific methods and views. He was loth to part with what he considered good until he was absolutely convinced that he might obtain something better. But when the better had really been demonstrated he lost no time in changing either views or methods. His attitude toward the various proposed changes in the rules for governing the nomenclature is a good case in point. While anxious that there should be no blind adherence to rules already established, and perfectly ready to accept such changes as might lessen such confusion as already really existed, he viewed retroactive measures overturning hosts of names already long and firmly established in the literature as productive of great immediate confusion without giving by any means a certain promise of surer criteria upon which to establish stability in the future; in fact as giving no greater certainty, if as great, as that given by the rules already existing and followed for years by the best workers.

As a teacher he was kindly and inspiring, not suited to manage large classes of unwilling students, such as often fell to his lot, where much sternness and rigor was needed to compel the wavering attention and to force the stubborn mind to effort, but especially fitted to encourage and to train those desirous of pur-

suing either some especial line or even of obtaining a general botanical education. To these he tendered the privileges of his library and collections, which had to be supported by himself alone, and opened to them not only all the material resources at his command, but unlocked for them all the treasures of his own experience, the results of the patient study of many years.

Professor Eaton's religious views were shown rather in the earnestness and simplicity of his life than by any profession of faith. Where he could not thoroughly understand and believe he was contented to hope, and his last months, even during intense suffering, were hopeful and peaceful, and he left this life calm in his trust in the good to come. He was a communicant of the Episcopal Church, and attendance upon divine worship was to him a pleasure and an inspiration rather than a duty. At his particular request, his funeral services were of the nature of simple religious consolation to his relatives and friends, with an entire absence of official ceremony.

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[Reprinted without change in the 2d Edition, 1885.]

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* The basis for the present list was taken from the "Bibliographies of the present officers of Yale University," edited by Prof. Irving Fisher (New Haven, 1893). The list of works there given was written out by Prof. Eaton. This has been followed in the main, but the greater part of the references have been compared and some changes and additions made. The writer is very much indebted to Mrs. Eaton, to Mr. George F. Eaton and to Prof. W. H. Brewer for much help, both in connection with the details of the bibliography and of the sketch of the life of Prof. Eaton.

enumeratae novaeque descriptae: dissertatio inauguralis, quam in auditorio botanico Universitatis Harvardianae ad gradum baccalaurealem in scientiis legitime obtinendum die XIV. Jul. MDCCCLX., habuit Daniel C. Eaton, A. M. Mem. Acad. Amer. Scient. et Artium. (II.) 8: 193–218.

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The Genus Sanicula in the eastern United States, with Descriptions of two new species.

By Eugene P. Bicknell.

(Plates 241–245.)

It has been generally received as a settled fact of our geographical botany that the genus *Sanicula* had but two representatives in the flora of eastern North America. These plants, *S. Marylandica* and *S. Canadensis*, though coming down to us as well-accredited species from the time of Linnaeus, have proved a recurring source of confusion to our botanists and, as now appears, have never been rightly understood. In 1824 Dr. Torrey reduced *Canadensis* to a variety of *Marylandica* (Fl. U. S. 302), and in 1838 Torrey & Gray (Fl. N. Am. 1: 602) discredited the plant altogether naming it as a synonym of the latter species. A few years later, however, Dr. Torrey took occasion to restore the plant to its original status, remarking that he had become persuaded that the two species were quite distinct (Fl. State of N. Y. 1: 265); notwithstanding this, recent authorities have reverted to Dr. Torrey's earlier view. In the "Review of North American Umbelliferae, Coulter & Rose" (1888), *S. Canadensis* finds recognition only as a slightly differentiated form of *S. Marylandica*, a disposal of the plant which is followed in the sixth edition of Gray's "Manual"

(1893). Dr. Britton, however, in his "Catalogue of Plants found in New Jersey" (1889), again accords both plants full specific rank. That this understanding of the problem is the only one which the facts allow does not admit of any question whatever. The most zealous reductionist need have no trouble in assuring himself of this, provided only that ordinary eyesight and an open mind be not wanting to his equipment. Indeed, as species present themselves, these two plants must be regarded as not even very closely related within their common genus. The trouble all along has been that we have unwittingly been seeking to force *four* distinct species into the limits defined for two. As an inevitable result these two, though wholly distinct, have been seen under such confused outlines as to make it appear quite impossible to assign any constant characters to either. It thus becomes necessary to diagnose them anew in connection with the description of their long over-looked congeners.

It has not been ventured to define two new eastern species of this difficult genus without considering very carefully their relationships with the species already known, at the same time keeping in mind the harmfulness of distinctions too finely drawn. The danger of fallacious distinctions, however, proves not to press at all closely in the present case. A critical study from herbarium specimens of the four plants here presented, which has supplemented an intimate acquaintance with three of them in the field, enables me without any reservation to subscribe them all as authentic and well-defined species.

Sanicula Marylandica L.

Commonly two or three feet high—one-and-a-half to four feet; stem single, or two or three together from the same rootstock, terminating in a general umbel which is usually but ⅛ to ¼ the length of the entire plant; there is frequently also a short, imperfectly umbellate lateral branch. Leaves thickish, dull bluish green, two or three on the stem between the basal leaf and the involucre; basal leaves several, on long erect petioles, only one of them cauline, the others rising separately from the rootstock; free stem-leaves nearly or quite sessile, or the lowermost short-petioled; involucral leaves usually much reduced, sometimes under an inch long, cleft or parted, not divided into separate leaflets; larger leaves five-divided, appearing seven-divided from the deep partition of the basal leaflets; upper leaves five-divided, or appearing so. The leaves gen-

erally are large, spreading from three or four to eleven inches, the leaflets reaching a size of six inches by three; leaflets variable in shape and marginal pattern; cuneate-obovate, to oblanceolate, or sometimes elliptic, obtuse or acute, irregularly doubly serrate, serrate or dentate-serrate, with mucronately-pointed teeth, usually more or less incised-lobed towards the apex. Branches of umbel rather rigid, usually sharply ascending, normally three—two to four—and sub-equal, two to eight inches long; ultimate rays three, an inch long—3″–18″—(abnormally longer and bearing a pair of minute bracts) sometimes divaricate; rarely the umbel may be unevenly three times compound; secondary involucres of firm foliaceous bracts, either cut-lobed or merely serrate, often minute, rarely reaching a length of one inch. Sterile flowers numerous, with the perfect flowers, or in separate peduncled capitate clusters; pedicels 2″ long; calyx 1″, cleft nearly to the base into narrowly lanceolate attenuate-cuspidate lobes; petals oblanceolate, equalling or slightly exceeding the sepals, greenish-white, as are the anthers; filaments exserted, 2″ long; umbellets at anthesis 5″–7″ wide. Fruits large, 3–6 in each umbellet, somewhat ovoid, sessile, spreading, the body 2″ long and nearly as broad or, through the bristles, 3″–5″ wide, 3″–3½″ high; bristles numerous, crowded, arranged in no regular order, very straight to the minutely hooked apex, prominently corky-bulbous below, rudimentary at base of carpel, above becoming 2″ long, ascending, the uppermost erect, parallel with and about equalling the erect calyx-lobes; styles long, at first erect-spreading but early recurving from the top of the closed calyx sometimes quite outside of the bristles. Transverse section of seed somewhat oblong, seed-face plane or slightly concave, dorsal surface more or less fluted or grooved for the partial accommodation of the five large oil-tubes; frequently a slight separation of the wall of the pericarp from the middle of the seed-face leaves a cavity having the appearance of an additional oil-tube; pericarp corky-thickened, pale brown; commissural scar broad, elliptic. Root perennial, of very coarse fibres fasciculate from a short knotted contractedly-branched rootstock, which, when cut, has a distinct terebinthine odor.

Newfoundland and Canada, southward to the mountains of Georgia, west to the Rocky Mountains. (Plate 241.)

A specimen of a *Sanicula* which, for the present, must be regarded as an aberrant form of this species was gathered on Lookout Mountain, Tennessee, June 21, 1894. The plant is small and has two very unequal branches, one capped by a single umbellet, the other bearing an umbel of four divaricate rays; the leaves are *trifoliate*, with obovate nearly simply-serrate leaflets, the lateral

ones deeply cleft; the three stem leaves are slender-petioled, even the involucral leaves are short-petioled. The immature fruit when crushed exhales an odor much like that of the herbage of the carrot, and very different from that of true *Marylandica*. The styles are shorter than normally, and not recurved, and with the stylopodium are perfectly developed in all the infertile flowers, which are further noteworthy from their rigidly spreading sepals.

I have observed no other instance of styliferous sterile flowers in any of our eastern *Saniculae*, though an examination of specimens of *Sanicula Europaea* show that they occur normally in that species.

So far as an inference may be drawn from this single specimen, we may suspect the existence in the Southern Alleghenies of still another form of *Sanicula* meriting definite recognition.

The plate of *S. Marylandica* in "The Flora of the State of New York" well illustrates the confusion that has prevailed with regard to this species. The large leaf in outline, together with the single bristle, the mature carpel and the fruit section, are of *S. Marylandica;* the figure of the upper part of a fruiting plant, and the detached umbellet, are good representations of *S. gregaria* as here distinguished.

SANICULA GREGARIA n. sp.

Stems rather weak, often clustered, from one to three feet high, commonly two to two-and-a-half feet, naked to the first branch or with a single petioled leaf, above dividing into a freely branched three or four times compound general umbel which takes up usually ¼ to ½ the length of the plant. Basal leaves usually more numerous than in *Marylandica*, sometimes nearly as large and as long-petioled, only one of them truly cauline, the others rising from the rootstock near the base of the stem. Leaves thin, bright green, digitately five-divided, the divisions all petiolulate, or the lateral pairs slightly united at base; leaflets varying from cuneate-obovate, through rhombic, to elliptic and lanceolate, sharply doubly-serrate with bristle-tipped teeth, often regularly serrate-lobed along the margins, sharply incised-lobed above, acutely-pointed; involucral leaves scarcely reduced, trifoliate, the petiolulate leaflets commonly lanceolate, often somewhat curved or sub-falcate; involucres of the second, and even of the third, series conspicuously foliaceous, the former three-divided, and sometimes spreading four or five inches, the latter merely lobed. Branches of general umbel, with their divisions, commonly in sub-equal

series of three, sometimes of two, slender, straight, ascending, the ultimate rays 6″–15″ long or, occasionally, much longer in effort to branch again for an umbellate division of the fourth series, which may be perfectly realized. Frequently the primary division of the stem is only sub-umbellate owing to the displacement of one of the branches; on many plants there is a well-developed lateral flowering branch. Staminate flowers with the fertile, or in separate heads peduncled in the forks of the stem or main branches; pedicles slender, 1″–2½″ long, four or five times times the length of the minute campanulate calyx, which is cleft little more than half way down into somewhat triangular-ovate rather obtuse lobes; flowering umbellets small, about 3″–4″ in diameter; petals obovate, heart-shaped, fully twice the length of the sepals, yellowish-green, filaments exserted, anthers bright yellow. Fruits very small, 3–5 in each umbellet, broader than long, and somewhat obovate in outline, measuring through the bristles 1½″–2″ high, by 2″–2½″ wide, evidently pedicelled, pedicels not over 1″ long, papillose with rudimentary bristles; bristles of the fruit very small and weak, rudimentary at base of pericarp, gradually lengthened above, but not exceeding 1″, and commonly half that size, not crowded, arranged in eight or ten rows which may be evident or obscure, curved at tip into a more open hook than in *Marylandica*; though sometimes slightly depressed-dilated at base, they commonly rise abruptly from the nearly even surface of the mature carpel, which is of a dark or blackish color; fruit reflexed at maturity; styles abruptly spreading and recurved among the bristles, sometimes extending more than half way around the fruit. Seed rounded-oblong in cross-section, dorsal surface even, not at all sulcate or angled, commissural face plane; pericarp thin and membranous, closely investing the seed; oil-tubes five, very small; commissural scar linear. Rootstock much as in *Marylandica*, but not so stout and contracted, the fibres less fasciculate, much more slender and fibrillose, and of a blackish instead of brownish color. The substance of the rootstock has a fainter and altogether different odor. (Plate 242.)

This plant when once known is in no danger of being confused longer with either *Marylandica* or *Canadensis*. It is clearly a perfectly distinct species, not even to be regarded as intermediate between the other two, nor as related to them by any nearer ties than those of a common genus. Its nearest affinity is with *Marylandica*, with which it has been mainly confounded, notwithstanding that the general aspect of the two is strikingly dissimilar. To compare the superficiary characters, *S. gregaria* is a less robust plant, more widely branched and more leafy above, but with less

leafy stem, quite missing the general appearance presented by *Marylandica* of a tall strict plant stiffly umbellate at the top of a simple stem. The general umbel of *gregaria* is more compound and much more slenderly branched and foliaceous; the leaves are thin and bright green, in contrast with the firm and dull or bluish-green leaves of *Marylandica;* furthermore the leaves of *gregaria* are never seven-divided, nor are the basal leaflets parted or deeply cleft, as seems always to be the case with both *Marylandica* and *Canadensis;* the leaves, too, are more pointed, and more sharply incised and serrate-lobed than in *Marylandica*, and never assume the narrowly oblanceolate form with long tapering base so often seen in that species. In the early spring the plant forms dense clusters of leaves which may number forty or more rising from one compound rootstock. At flowering time the bright yellow anthers and yellowish-green petals of *gregaria* give the plant a characteristic appearance and distinguish it conspicuously from our other species. The flowers, moreover, have a slight fragrance faintly suggestive of those of the spice bush.

This plant seems to have escaped the observation of every one of our botanists except Dr. Darlington, who, in his "Flora Cestrica," makes an unmistakable allusion to it. Speaking of *S. Marylandica*, he says, "It also presents a *variety*, with dullish *yellow* flowers."

As already remarked, a good figure of this species appears in "The Flora of the State of New York," in the plate of *S. Marylandica*.

S. gregaria usually grows in close leafy often extensive communities, in damp low woods and thickets; *S. Marylandica* is much less gregarious, scattering itself in loose colonies through rich, often hilly or rocky woods; *S. Canadensis* often grows in a still more scattered way, and seems to prefer a simpler more earthy soil than *Marylandica*. Sometimes, however, in damp thickety spots in somewhat rocky woods all three plants may be found near together.

S. gregaria is the first of the three to flower in the spring, coming into bloom at New York from the second to the fourth week of May; *S. Marylandica* follows a week or two later, more or less; *S. Canadensis* is much later, not flowering before the third or fourth week in June, in some seasons not until July.

S. gregaria is perhaps the most common *Sanicula* near New York City, and is described from specimens collected in Van Cortlandt Park. In the Herbarium of the Torrey Club is a specimen labeled "New Durham, N. J., June 6, 1862, W. H. L. [eggett]." The specimens contained in the Columbia College Herbarium are as follows: "Virginia, Asa Gray, 1840," also bearing the stamp of the Meisner Herbarium; "Southwestern Virginia, slopes of White Top Mountain, 2600–5000 feet, collected May 28, 1892, by N. L. and E. G. Britton and A. M. Vail;" "Southeastern Virginia, Greenville County, June 19, 1893, A. A. Heller;" "Fort Riley, Kansas, May 27, 1892, E. E. Gayle;" "Arkansas, Dr. Pitcher;" "Northeastern Nebraska, June 15, 1893, Fred Clements."

SANICULA CANADENSIS L.

Usually lower and more slender than *S. Marylandica*, but sometimes even stouter and taller, one to over four feet high. Stem always single, widely branched above, and readily putting forth alternate axillary branches which, sometimes beginning at the base of the stem, may number six or more up to the terminal fork; branches ascending, naked below, their upper divisions often widely spreading, even horizontal, the whole forming an open panicle which may spread to a breadth of two feet. General plan of branching dichotomously or paniculately-umbellate, often appearing widely dichotomous throughout from the constant suppression of a third branch in each ascending series; the umbellate character of the branching is thus much less obvious than in our other species, realizing itself definitely only in the distal ramifications or in the terminal umbels; above the involucres the branching varies from definitely dichotomous and two or three times compound, to indefinitely decompound, with somewhat fasciculate umbellets; the fruit-bearing rays are only 1″–5″ long, much shorter than in any other one of the eastern species. Basal leaves from two or three to six or more, erect on long petioles, all strictly cauline; free stem leaves commonly four to eight on petioles of gradually decreasing length above, but not becoming obsolete even in the involucral leaves, or [illegible]ed, in the secondary involucres; leaves three-divided appearing [illegible]entafid from division of the lateral leaflets, or the upper stem leaves more rarely the lower, sometimes simply trifoliate; leaflets dull green, cuneate-obovate, oblong or elliptic, often oblique, with less pronounced tendency to narrowly obverse development than is shown by *Marylandica*, and never, apparently, assuming the oblanceolate forms so frequent in that species; also, as a rule, less coarsely ser-

rate, and much smaller, though occasionally reaching a breadth of six inches, with leaflets over 3½″ × 1½″; involucral leaves more or less reduced, even sub-bracteal, three-divided, those of the succeeding series very small and bract-like, divided or cut-lobed. Umbellets very small at anthesis, few-flowered; sterile flowers with the perfect ones, never in separate heads, few, often only one or two in each umbellet, ½″ long, on pedicels not over 1″ long, often less; calyx deeply parted, sepals narrowly lanceolate, acute or cuspidate, exceeding the minute white petals; anthers white, little exserted. Fruit subglobose, three together in one plane, the lateral spreading or slightly reflexed, very small, 1″–1½″ long and broad, or, measured through the bristles, about 2″ long by 2″–3″ wide; short-pedicelled, more distinctly so when young; pedicels ¼″–½″ long, wrinkled, striate; bristles numerous, dilated below, somewhat regularly arranged in longitudinal rows, well developed to the very base of the carpels, of more uniform length throughout than in *Marylandica*, and more spreading, rarely exceeding 1″ in length, the uppermost closely parallel with and equaling, or slightly exceeding, the erect calyx-lobes; styles small and difficult to observe, shorter than the calyx-lobes; mature fruit dull brown; commissural scar linear. Seed more rounded in cross-section than in *Marylandica*, the dorsal surface more prominently sulcate-fluted, the face convex, sometimes sharply so, and bevelled off on either side to permit a more interior position of the commissural oil-tubes than is seen in *Marylandica*. Root consisting of rigid horizontal fibres, which taper slenderly from a strong woody base.

Massachusets to Florida and Texas, west to Kansas and Nebraska. (Plate 243.)

The genus *Sanicula* is set down as consisting of "perennial herbs," yet this plant, in the vicinity of New York at least, is not perennial but apparently biennial. Unlike *Marylandica* and *gregaria*, the mature plant is readily pulled up from the soil, and in the autumn, while these species are still green, is to be found completely dead throughout, with the roots beginning to decay.

This species stands sharply apart from both *Marylandica* and *gregaria*, not only in the characters of leaves, flowers and fruit, but in fundamental differences in the root and the plan of branching. It is indeed hard to understand how such obviously distinct species could ever have been confused.

The species shows two main lines of variation which, in their extreme manifestations, present plants of somewhat dissimilar aspect. On the one hand the result is a slender plant with small

fruit and leaves, the latter with finely-cut marginal pattern, the branching widely dichotomous and confined mainly to the upper part of the stem; the opposite form is coarser and stouter, with ascending or even-suberect, often simpler, branches and larger fruit; the leaves are much larger with coarser serration, and more trifoliate tendency, those of the upper stem sometimes perfectly trifoliate. An extreme example of this form in the Columbia College Herbarium, labelled "Massachusetts" in Dr. Torrey's handwriting, is the only specimen seen in which the character of short styles does not hold strictly true; in this specimen, which is in the flowering stage, the styles are longer than the sepals, and somewhat spreading, though not recurved. It is to be said, however, that this particular plant is pretty certainly abnormal; the branching is unusually coarse, and the rays and pedicels somewhat thickened, apparently indicating a tendency to fasciation.

SANICULA TRIFOLIATA n. sp.

About two feet high; branches several, alternate, ascending, or the lower often longer and suberect, simple, terminating either in the flowering umbel or in two frequently widely-spreading umbel-bearing rays, with a shorter simple ray between; rays of flowering umbels three to five, about an inch long; involucres and involucels of small serrate leafy bracts. Cauline leaves petioled, large, five to seven inches broad, conspicuously trifoliate, the broad leaflets petiolulate, ovate, elliptic-ovate or rhombic, coarsely doubly serrate with rather open, almost spinescently-mucronate teeth, or even incised-lobed, acute, the lateral leaflets mostly not at all cleft, except sometimes in the lower leaves; basal stem-leaves long-petioled, smaller than the main cauline leaves, the leaflets even slightly united at base, often obtuse, the lateral pair narrowly cleft on the lower side, but not sufficiently so to destroy the trifoliate character of the leaf. Sterile flowers few, ½″ or less long, on slender pedicels about 2″ long; sepals lanceolate, acuminate-cuspidate with slightly incurved points. Fruits sessile, three to five together, somewhat reflexed at maturity, ellipsoid or globose-oblong, large, becoming 3½″ high to tip of the erect sepals, the greatest spread of the bristles under 3″; prickles stout, swollen below, not crowded, small and reflexed at the base of the carpel, above becoming 1½″ long, and spreading or ascending; sepals on mature fruit 1″ long, united at base, appressed, echinate with sharp, slightly incurved points, raised on a slight prolongation at the apex of the fruit, and forming a conspicuous beak-like projection quite distinct from the

surrounding prickles and usually a little exceeding them; styles short, nearly erect, strictly included; commissural scar elliptic, occupying most of the face of the mericarp. Seed somewhat crescentic in transverse section, the dorsal surface even, the face concave, sometimes almost sulcate; oil-tubes of two kinds, one set consisting of a pair of large vittae latero-commissural in the pericarp; the other set a series of minute ducts lining the inner face of the pericarp, especially along the commissural concavity, where they may number as many as twenty. In the dried fruit the hardened secretion of the large tubes is nearly colorless, that of the minute ducts of a reddish-amber color. Root somewhat similar to that of *S. Canadensis* and likewise, apparently, not perennial. (Plate 244.)

While in its general aspect this plant stands out clearly enough from our other species, the crucial test of fruit characters shows it to be indeed profoundly different. In fact, its fruit, in the numerous minute oil-tubes, supplemented by a large outer pair having, apparently, a different secretion, presents characters hitherto unreported in the the genus so far as I have been able to discover.

I find three specimens of this plant in the Columbia College Herbarium, and one in the Herbarium of the Torrey Club, now at the College of Pharmacy in New York. Of the former, one is especially interesting as having passed through Dr. Torrey's hands and bearing his note: "Intermediate between *S. Marylandica* and *S. Canadensis;*" it is labeled simply "Ohio." The other specimens are all named *S. Canadensis*; one is No. 835 of the Geological and Natural History Survey of Canada, and is labeled "dry, rich woods, Ontario, Amherstburg, Macoun, 5, 10, 1892;" another was collected by Dr. Britton at Indianapolis, Aug. 25, 1890. The specimen in the local Herbarium is of a complete fruiting plant and bears witness to Mr. Leggett's careful methods in botanical work; it is labeled "Canaan, Conn., '68, W. H. L." The label, however, is not in Mr. Leggett's handwriting, and, as it was doubtless copied and affixed after his death, is perhaps open to doubt as applying to the identical plant which now bears it. The localities of Ontario, Ohio and Indiana suggest a more exclusively central distribution than limits our other species, though the plant may well occur further east. I feel almost certain of having myself seen it in Alleghany County, New York, in 1891, in a flora strongly characteristic of the northern Alleghenies.

In this connection it is interesting to note that when, in 1824, Dr. Torrey reduced *S. Canadensis* to a variety of *S. Marylandica* he evidently based his conclusion upon the examination of a specimen of the very plant here described as *S. trifoliata*. This is made pretty clear by his description of his var. *Canadensis*, which was drawn up, by the way, from a specimen collected at Litchfield, Connecticut. As already remarked, Dr. Torrey afterwards revised his opinions in regard to *Canadensis* and a plate of the species occurs in his flora of the State of New York.

Descriptive Key to the eastern Species of Sanicula.

Styles long, recurved; branching definitely umbellate throughout; sterile flowers often in separate heads; perennial.

a. Fruit large, 3″ or more high to tip of sepals, ovoid, sessile, spreading; pericarp corky-thickened; bristles stout, bulbous at base, becoming 2″ long, but not exceeding calyx-tubes; sterile calyx 1″ long, deeply parted; sepals lanceolate, cuspidate-acute; general umbel twice compound, ⅛ to ¼ the length of entire plant; stem-leaves two or three; larger leaves 7-divided; involucral leaves cleft; petals and anthers greenish-white, the petals oblanceolate, equalling the sepals; commissural scar elliptic; seed furrowed dorsally; oil tubes large. *Marylandica.*

b. Fruit very small, under 1½″ somewhat obovoid, short-pedicelled, reflexed; pericarp membranaceous; bristles weak, not bulbous at base, ½″ to 1″ long, but exceeding calyx-lobes, sterile calyx ½″ or less, cleft only half way down, sepals ovate, obtuse; general umbel three times compound, ¼ to ½ the length of plant; stem naked or with a single leaf; larger leaves 5-divided; involucre of distinct leaflets; anthers deep yellow; petals yellowish-green, obovate, twice the length of sepals; commissural scar linear; seed not furrowed, oil tubes very small. *gregaria.*

Styles short, included; branching mostly alternate and dichotomous; sterile flowers not in separate heads; biennial at least as to c.

c. Fruit small, under 2″, subglobose, short-pedicelled, scarcely reflexed; bristles weak, under 1″ long, dilated below; sepals on mature fruit inconspicuous among the longer erect bristles; pedicels of sterile flowers 1″ or less; calyx deeply parted; larger leaves mostly 5-divided; branching more or less decompound; commissural scar narrow; oil tubes five, large; seed furrowed on dorsal surface; seed-face convex. *Canadensis.*

d. Fruit large, becoming 3½″, ellipsoid, sessile, reflexed; bristles stout, becoming 1½″ long; sepals on mature fruit forming a conspicuous beak-like projection free from the somewhat spreading bristles; pedicels of sterile flowers 2″; leaves large, conspicuously trifoliate; branching once or twice compound; commissural scar broad; oil tubes of two kinds, a pair of large ones and numerous small ones; dorsal surface of seed not furrowed; seed face concave. *trifoliata.*

Plate 245 is a conventional representation illustrating the plan of branching and foliar arrangement of each of the four eastern species of the genus.

New Fungi, mostly Uredineae and Ustilagineae from various Localities, and a new Fomes from Alaska.

By J. B. Ellis and B. M. Everhart.

Fomes tinctorius E. & E.

(On hemlock trees or logs?)

Admiralty Island, Alaska. Collected by James G. Swan, no. 20, 851. Comm. Frederick V. Coville, Botanist, U. S. Dept. Agr.

Pileus dimidiate, sessile, subunguliform, convex below, slaty brown, with a few elevated concentric zones, the surface of which is more or less cracked, substance flocose-fibrous, deep red, somewhat friable, superficial layer indurated, slate color, margin obtuse, 6–7 cm. long and broad, by 4–5 cm. thick. Pores large, 1–2 cm. long, 1½–2 mm. thick, same color as the inner substance of the pileus, filled with grumous matter and spores. Spores subglobose or short elliptical, red, 5–6 × 3½–4½ μ.

Resembles somewhat *F. lateritius* Cke., but pores much larger and not stratose. When ground up it looks like madder, and is used for dyeing.

Ustilago Arenariae E. & E.

In the inflorescence of *Arenaria congesta* Nutt., North Park, Colo., July, 1894. Alt. 9000 ft. (Prof. C. S. Crandall, no. 119.)

Spore mass purplish-black. Spores oblong-elliptical, opaque, 14–17 × 8–10 μ, with a minute hyaline appendage at the base. The spores resemble the sporidia of *Nummularia Bulliardi* Tul.

Ustilago Mulfordiana E. & E.

Infesting and destroying the panicles of a species of *Festuca* while still enclosed in the sheath. Near Boise City, Idaho, June, 1892. (A. I. Mulford.)

Mass of spores nearly black. Spores when moistened globose or nearly so, 10–14 μ diam., epispore minutely roughened; when dry many of them become oblong or short-cylindrical, 10–14 × 6–8 μ.

Ustilago monilifera E. & E.

In ovaries of *Heteropogon contortus*. Tucson, Arizona, May, 1893. (Prof. J. W. Toumey, no. 2.)

Mass of spores tobacco brown. Spores concatenate, lying in parallel chains, subglobose, subcubical or subangular, hyaline at first, then brown, 8–12 μ in the longer diameter, and very minutely echinulate when highly magnified.

SOROSPORIUM SOLIDAGINIS E. & E.

Proc. Acad. Nat. Sci. Phil. February, 1893: 156.

This is the same as *S. cuneatum* Schofield, in the 2d Ed. of Webber's Appendix to the Cat. of Flora of Neb., published June, 1892.

PUCCINIA LIGUSTICI E. & E.

On leaves of *Ligusticum scopulorum* Gray. Sangre de Christo Mts., Colo. Alt. 10,000 ft. July, 1888. (Rev. C. H. Demetrio, no. 201.)

III. Sori hypophyllous, minute, chestnut-colored, erumpent and surrounded by the ruptured epidermis, densely crowded in suborbicular clusters 1½–2 mm. diam. on small, pallid spots mostly near the margin of the leaf. Teleutospores, elliptical or oblong-elliptical, obtusely rounded at both ends, pale brown, scarcely or only slightly constricted, 22–30 x 15–20 μ, epispore slightly roughened but not distinctly thickened above.

PUCCINIA NESAEAE (Ger.).

Aecidium Nesaeae Ger. Bull. Torr. Bot. Club, 6: 47.

On leaves of *Nesaea verticillata* near Concordia, Missouri. (Rev. C. H. Demetrio, no. 145.)

III. Sori orbicular, minute, bordered by the upturned epidermis, collected in dense clusters or also scattered singly, usually clustered on the tubercular-thickened parts of the leaf previously occupied by the *Aecidium*.

Teleutospores oblong, clavate oblong or oblong-elliptical, deeply constricted, strongly thickened at the apex, usually with a hyaline papilla, pale yellowish brown, 30–45 x 12–15 μ. Pedicels stout, subhyaline, about as long as the spore.

RAVENELIA ARIZONICA E. & E.

On living leaves of *Prosopis juliflora*. Tucson, Arizona, Aug., 1894. (Prof. J. W. Toumey, no. 37.)

Amphigenous; sori erumpent, soon naked, small, black; heads not compact in the sori, orbicular, 75–85 μ diam., deep chestnut brown, hemispherical, spiny, marginal spores about 20 (18–25) in number, inner spores about as many more, 18–22 x 7–8 μ; number of spores in a cross section through the center of the head 7–9. Cystidia ovate-globose, swelling out so as to be visible around the margin of the head viewed from above. Stipe short, straight, consisting of only a few hyphae. The short, nearly hyaline spines are distributed over the entire surface of the head, about as in *R. echinata* D. & L., from which this differs in the larger orbicular

heads, containing a much greater number of spores. *R. Holwayi* Dietel on the same host, has no spines. Uredospores in the same sori with the teleutospores, obovate or elliptical, rough, 23–30× 15–18 μ, pale yellowish-brown.

DOASSANSIA AFFINIS Ell. & Dearness.

On *Sagittaria variabilis*. London, Canada, July, 1895. (Dearness, 2269.)

Sori hypophyllous, pustuliform, globose or elliptical, 200–300 μ in the longer diameter, dark-colored and collapsing above, gregarious in elongated groups, the part of the leaf occupied being at first yellowish. Spores globose or elliptical, 8–10 μ in the longer diameter, epispore comparatively thin.

Differs from *D. Sagittariae* on the same host, in its larger sori and smaller less angular spores with thinner epispore. From *D. obscura* Setchell it differs in habit and character of the sori; *D. opaca* Setchell differs in its larger spores as well as in some other respects.

AECIDIUM SPHAERALCEAE E. & E.

On leaves of *Sphaeralcea angustifolia*. Las Cruces, New Mexico. June, 1895. (Prof. T. D. A. Cockerell.)

Hypophyllous, densely cespitose in clusters 2–8 mm. diam. Aecidia deep orange color, cylindrical, closed at first, then open, margin toothed, becoming entire, cups about ½ mm. high, 350–400 μ broad. Spores subglobose or elliptical, smooth, 15–20 μ in the longer diameter, orange-yellow. Spermogonia on yellowish spots on the upper side of the leaf.

Differs from *A. Callirhoes* E. & K. in its cylindrical aecidia and deep orange color.

PERONOSPORA WHIPPLEAE E. & E.

On leaves of *Whipplea modesta*, Ukiah, Mendocino Co., Cal., May, 1894 (W. C. Blasdale).

Mycelium hypophyllous, effused, dirty gray. Fertile hyphae 250–350 μ high, 3–4 times dichotomously branched, the ultimate divisions simple or bifid and usually bearing on one side a short, straight, lateral branchlet 6–8 μ long. Conidia short-elliptical, brownish, smooth, 18–22 x 12–15 μ. Oöspores not seen.

This appears to be distinct from *P. ribicola* Schrtr., the only other species recorded on Saxifragaceae.

Studies in the Botany of the Southeastern United States.—IV.

By John K. Small.

(Plate 246.)

Sieglingia Chapmani n. sp.

Wiry, slender, glabrous (except the tops of sheaths and parts of the inflorescence), bright-green, perennial by a horizontal root-stock. Culms solitary or two or three together, erect, strict, 9–15 dm. tall, mostly purple about the nodes; lower leaves rather numerous, nearly erect, 4–6 dm. long, the upper few, divaricate, somewhat shorter, all firm, flat when young, soon involute and almost filiform, 7–11-ribbed, smooth and glabrous; lower sheaths about 1 dm. long, upper ones often 2 dm. long, all ⅓–½ shorter than the internodes; ligule a short fringe of rigid villous hairs, above which, on the upper surface of the leaf, is a tuft of longer villous hairs; panicle averaging about 2 dm. high, viscid above, broadly ovoid, its branches rigid, filiform, divaricate (not drooping at the ends), the nodes tufted with bunches of silvery-villous more or less viscid hairs; spikelets very slender-pedicelled, rather few, 7–8 mm. long, tinged with purple, almost linear (when dry oblong) 5-flowered; empty glumes lanceolate, one-nerved, the lower one ¾ longer than the upper; flowering glumes oblong-elliptic, 3-nerved, 3-pointed by the excurrent nerves which are villous for ½ their length; palet 2-nerved, scabrous on the two nerves, slightly curved.

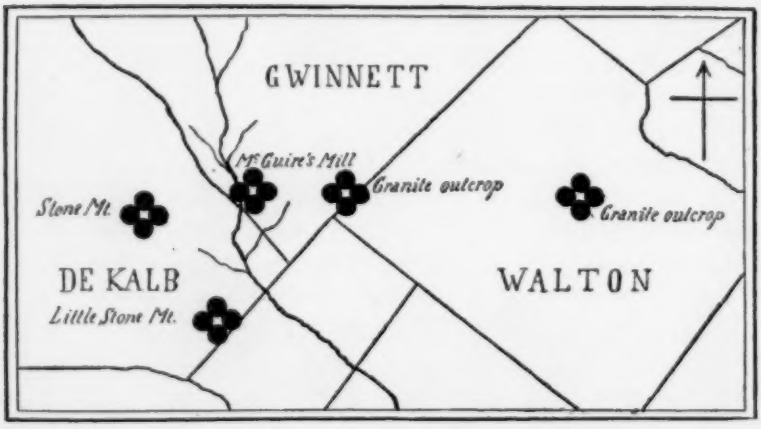
A species of southern distribution separable from *Sieglingia seslerioides* by its more slender and wiry habit, the very slender and diverging branches of the panicle and the usually conspicuous tufts of viscid hairs at the nodes throughout the panicle.

I found it last season growing in sand on the slopes of Currahee Mountain, near Toccoa, Georgia, and along the Yellow River, Gwinnett County, in the same State. Its range may be given as follows: Georgia, as just cited, to Texas: J. Reverchon; Bigelow, Camp No. 4, between Ft. Smith and the Rio Grande, south to Florida: Chapman, Curtiss (3454) Duval County.

Quercus Georgiana M. A. Curtis; Chapm. Fl. S. States, 422 (1860). Although heretofore supposed to be confined to a single station and to exist only in shrub form, *Q. Georgiana* is now known to have a considerable range and also to reach a development which allows it to be classed as a tree.

Stone Mountain, Georgia, is the original locality of this species. There it is more plentiful than at any of the new stations, but seldom attains the form of a tree. During the last two years I have found this interesting oak at four new places, and at all of these it grows plentifully and the tree form predominates instead of the shrub.

Along the Yellow River, about six or seven miles east of Stone Mountain, there are several large groves on the sides of the cañons where the granite rocks outcrop. Six or seven miles east of the Yellow River there occurs another outcrop of granite, and here two fine trees stand and bear fruit in great abundance. Travelling between the last mentioned station and the Oconee Mountain, a little to the south of east, I came upon another granite outcrop just west of the Oconee River. There the species again appears, and it is interesting to note that whenever found it is confined to granite outcrops. A fifth, or fourth, new locality is Little Stone Mountain, situated about nine miles south of Stone Mountain. There the species reaches its greatest development in size, measurements showing a height varying from twenty to thirty feet and a maximum trunk diameter of fourteen inches. The following map will give an idea of the geographic distribution of this oak.



PHORADENDRON FLAVESCENS (Pursh) Nutt.; A. Gray, Man. Ed. 2, 383. 1856.

This plant is quite plentiful in the vicinity of Stone Moun-

tain, Georgia. At all the places where I found it in that region its host was *Quercus Georgiana*, although there were numerous other deciduous-leaved trees growing with the latter species.

RUMEX FASCICULARIS n. sp.

Perennial by a cluster of fusiform tuberous roots, glabrous, of a dull, rather dark or olive-green color. Roots in clusters of from 3–5, 5–10 cm. long; stem lax and weak, 5–6 dm. long, decumbent and ascending, strongly grooved, abruptly thickened at the base and slightly thickened at the nodes; internodes 1–6 cm. long; leaves mostly oblong, occasionally a few oblong-ovate or ovate, 7–17 cm. long, 4–7 cm. broad, of much the same size throughout and clustered at the shortened end of the stem near the inflorescence, acute or obtuse, somewhat undulate and crisped, mostly truncate or cordate at the base, sometimes obtuse, thick (drying very thin), petioled; petioles stout, 3–7 cm. long, strongly dilated at their bases; ocreae thin and brittle, fugacious; panicle 12–16 cm. long, rather dense in fruit; racemes ascending, 1–5 cm. long; pedicels slender, narrowly clavate, winged at the summit, deflexed in fruit, 1–2 cm. long, articulated at the base; wings of the calyx broadly deltoid, 4 mm. long, 5 mm. broad, undulate, strongly nerved, each bearing an ovoid rugose callosity: style-segments reflexed on the angles of the achene; achene broadly pyramidal-ovoid, triquetrous, 2 mm. long, chestnut-colored, smooth and shining, the faces concave, the angles slightly margined. Plate 246.

A peculiar and striking species on account of its clustered leaves. The shape of the latter is different from that of any other North American member of the genus. By its inflorescence, wings and achene it is related to *R. Floridanus* and *R. verticillatus*, but the achene is broader and shorter than that of either of those two species. The stem is unable to support the weight of the leaves and inflorescence and bends over, endeavoring to rise again at the end.

The specimens were collected by Mr. Geo. V. Nash, on his recent excursion to Florida, in cypress swamps, on the marshy shore of Lake Harris, near Eldorado, in the central part of the peninsula.

ACER LEUCODERME n. sp.

Acer Floridanum acuminatum Trel.

A shrub, or small tree reaching a height of eight meters and a trunk diameter of from one to five dm., clothed with a smooth white bark. Trunk very short, sometimes almost wanting; branches (secondary trunks), two to eight together, erect or as-

cending, conspicuous by their white bark; branchlets clothed with a gray or reddish bark; leaves depressed-orbicular (*i. e.*, broader than high), or rarely orbicular in outline, mostly three-lobed, sometimes imperfectly five-lobed, 4–9 cm. in diameter, cordate or truncate, petioled, with a rather open and shallow sinus, dark green, glabrous and marked with light nerves above, greenish, tinged with red, prominently nerved and very velvety (to the touch) beneath, the lobes acute or acuminate (the 4th or 5th when present obtuse), each (or the terminal one only) bearing two obtuse teeth; petiole slender, reddish, 3–6 cm. long; flowers not seen; wings of the samaras oblong-spatulate, 1–2 cm. long, red, conspicuous, parallel or nearly so (more or less spreading when the fruits separate at maturity); seed oblong, its covering prominently veined.

A very handsome maple, characteristic on account of its habit of branching near the base into from several to many secondary trunks, and the white bark. The bright green color of its foliage and the usually bright red fruit render it conspicuous, and while the velvety pubescence on the lower surfaces of the leaves is not prominent it is remarkably soft and dense to the touch.

As far as I have observed, the tree is confined to the bottoms of two rocky cañons, that of the Yadkin River, in Stanley county, North Carolina, and especially that of the Yellow River, in Guinnett county, Georgia. Dr. Trelease has reported the tree from further south, where it doubtless occurs, but I do not know the character of the localities.

KOELLIA VERTICILLATA (Michx.) Kuntze, Rev. Gen. Pl. 520. 1891.

Pycnanthemum Torreyi Benth. Lab. Gen. & Sp. 329. 1834.

This species of Koellia has never been recorded as growing further south than Southwestern Virginia,* and consequently it has not been credited to the Southern Flora. In August, 1893, I found the plant growing in Northern Georgia, in Rabun county, near Estotoah Falls. It was quite plentiful in the valleys and ravines, at about 2000 feet altitude and inhabited localities much like those in which it was found in Southwestern Virginia.

SOLIDAGO YADKINENSIS (Porter).

Solidago Boottii var. *Yadkinensis* Porter, Bull. Torr. Club. 1892.

Perennial, slender, wand-like, glabrous and of an olive-green

* Mem. Torr. Club, 4: 146.

color throughout. Rootstock long, chaffy, horizontal; stem 5–15 dm. long, erect, simple below the inflorescence; basal leaves tufted, lanceolate or linear-lanceolete, the blade 10–30 cm. long, acute at the apex, acuminate at the base, the petiole 6–15 cm. long, winged; cauline leaves lanceolate, linear-lanceolate or linear-oblong, 3–15 cm. long, erect and appressed, acute at the apex, sessile, the lower ones like the basal, serrate with a few distant appressed or spreading teeth; inflorescence consisting of a simple terminal secund raceme or thyrse; heads campanulate, stalked, 3–4 mm. high, 25–35 flowered; involucral bracts in four to five series, oblong or linear-oblong, 1–2 mm. long, ciliate, obtuse, with a dark-green midrib and tip; corolla slightly longer than the pappus, more or less pubescent; rays yellow, oblong-spatulate, entire, 2–3-apiculate; achene columnar, obtuse at the base, 10–14-ribbed, pubescent with a few spreading hairs.

This species was first described as a variety of *Solidago Boottii* by Prof. Porter, from collections made by Mr. Heller and myself in middle North Carolina in 1891. On first meeting with the plant it seemed to me a good species, and field observations on it each succeeding season have convinced me of its specific validity. It grows only in rather open meadows scattered through the pine woods. The first specimens seen were of the simple type (*i. e.*, in which the inflorescence consisted of a simple terminal raceme) and not over six dm. tall. They were found near Gold Hill, N. C. Last season I found this type near the base of Dunn's Mountain, in the vicinity of Salisbury, N. C. However, a more robust and branched form is the more common state, and this occurs at many localities in middle North Carolina. Up to last season *Solidago Yadkinensis* was not known to grow outside the last mentioned region, but in September (1894) I met the plant growing luxuriently at two stations in middle Georgia; the one a botanically prolific meadow near Loganville, Walton county, and the other meadows near the base of Little Stone Mountain, DeKalb county. The Georgia specimens are a little more robust than those from North Carolina, but otherwise they are almost identical. The variation that does exist is due to the less exposed conditions under which the Georgia plants grew.

Botanical Notes.

Tumble mustard. A species of mustard that promises to be one of the most formidable tumbleweeds yet introduced in the United States has been found by Mr. J. H. Sandberg and Mr. J. M. Holzinger, well established as a roadside weed in the side streets of Minneapolis. It is *Sisymbrium altissimum* L. This species was collected on ballast ground at Philadelphia in 1878, and in 1885 it was found near Castle Mountain on the western boundary of Alberta. During the past five years it has become a troublesome weed in the vicinity of Indian Head, Assiniboia. It is there known by the very appropriate name of "tumble mustard." It has also been found at Ottawa, Canada.

The tumble mustard may be distinguished from the other mustards by its slender siliques, 3 to 5 inches long, and by its characteristic tumbleweed habit, making a rather dense bush-like plant at maturity. If discovered elsewhere than in the five places mentioned, the undersigned will be grateful for reports of the localities. In case of doubt as to determination franks will be sent for mailing and the specimens will be determined at the National Herbarium. LYSTER H. DEWEY.

WASHINGTON, D. C., August 14, 1895.

Reviews.

A Manual for the Study of Insects. John Henry Comstock and Anna Botsford Comstock. 8vo., pp. 701. Ithaca, N. Y. Comstock Publishing Company. 1895.

The entomological sky has become much cleared, so far as the student or beginner is concerned, by the publication of this *Manual for the Study of Insects.* There should be no difficulty now in determining in nearly every case the native insects as far down the scale of classification as the families to which they scientifically belong. This is made possible by numerous figures and tables of classification for each order, coupled with a general clearness of statement that does not bristle with an array of scientific terms. The book is essentially about insects and not

their describers, for no authorities are given. This matter is no doubt left to the check lists and other more special works.

The first chapter deals with classification and nomenclature; the second with crabs, spiders, centipedes and other near relatives of the true insects, and the remaining nineteen with the six legged insects or Hexapoda, each chapter being devoted to a separate order. This number of orders, as Prof. Comstock says, slightly exceeds that commonly adopted. The difference, as will be seen by the reader, results from dividing the Platyptera of recent classifications into four separate orders. Those adopted in the work are the following:

THYSANURA	Bristle-tails, Spring-tails.
EPHEMERIDA	May-flies.
ODONATA	Dragon-flies.
PLECOPTERA	Stone-flies.
ISOPTERA	White-ants.
CORRODENTIA	Procids and Book-lice.
MALLOPHAGA	Bird-lice.
EUPLEXOPTERA	Earwigs.
ORTHOPTERA	Cockroaches, Crickets, Grasshoppers, etc.
PHYSOPODA	Thrips.
HEMIPTERA	Bugs, Lice, Alphids and others.
NEUROPTERA	Aphis-licris, Ant-licris and others.
MECOPTERA	Scorpion-flies, etc.
TRICHOPTERA	Caddice-flies.
LEPIDOPTERA	Moths and Butterflies.
DIPTERA	Flies.
SIPHONAPTERA	Fleas.
COLEOPTERA	Beetles.
HYMENOPTERA	Bees, Wasps, Ants and others.

It is not supposed that this sequence is altogether a natural one, but the best that can be expressed in a linear series, and indeed, it does not make any difference whether, for instance, the Lepidoptera immediately precede or follow the Diptera.

The greatest space is given to the chapter on Lepidoptera, which occupies 222 pages, and it is chiefly in this much collected order that changes of classification are noticed. They are based upon the venation of the wings; the character of the antennæ, vestiture, etc., not holding so prominent a position as in other systems. This classification seems to be very good so far as clear-

ness is concerned, and is easily comprehended by the general reader, but perhaps specialists will not take to it so kindly.

In the chapter on Coleoptera the tiger beetles are mentioned first and the *Scolytidae* last. In some recent classifications running from the lowest to the highest this system is reversed.

The book is finely illustrated, containing 797 figures and six plates, the frontispiece (Plate I.) being colored. On page 154 is a picture of four grotesque leaf-hoppers sitting in a row on a grass blade, who rival in absurdity of expression the famous Brownies. Some of the illustrations include the plants on which the insects feed, and the food plants are also often mentioned in the text. Entomology as a rule does not form a conspicuous part in books on botany, but the botany of an entomology is a more important matter, many of the insects taking their names from the plants upon which they feed. The illustrations of the wing-veins are particularly numerous, and it is these, and the tables for determining the families and higher groups, that contribute largely to the clearness of the book. W. T. DAVIS.

Studies in Plant Development. Henry L. Clark. Chicago. 1895.

One is at a loss to know just what to say on examining this outline of plant analysis, for such it is, neither more nor less. Judging from its mechanical construction and arrangement one would conclude that it was intended to serve as an aid in teaching young children the first principles of systematic arrangement, but the terminology, which is that of Vines (see his recent text-book on botany), will at once condemn it for such a purpose. The terminology used would lead one to suppose that it was intended for the use of advanced students and specialists in botany. Any one sufficiently advanced to comprehend the meaning and application of such terms as *gametophyte*, *apogamy*, *germ-plasm*, *body-plasm*, *microspore*, *macrospore*, etc., etc., certainly does not require an outline in the study of plant types. It is detrimental to teach students that such outline-study is botany. It is true, the author recommends a "constant use" of Vines' Text Book of Botany in connection with this outline work, which is good as far as it goes. It is, however, wholly wrong to teach students that they can become systematists without having first studied morphology and

physiology. This prevailing idea has already done an inestimable amount of harm to the advance of botany. No student "may quickly be taught the small amount of technique (of the compound microscope) necessary to do outline work." It requires years of patient toil to learn how to use the compound microscope. *Any* person can look down the tube of a compound microscope, but whether said person knows and comprehends what he sees, or whether he sees anything at all, is another question. My advice is that the student should lay aside the "Studies in Plant Development" until he has mastered the rudiments of plant morphology and physiology by years of patient work in some well equipped laboratory and by consulting not only Vines but all other standard authorities on plant physiology and morphology. After this is accomplished the "Studies" may be permanently stored away in the garret along with other similar analyses.

As far as the make-up of the "Studies" is concerned it lacks nothing. Binding, paper and print are excellent. There is space for the "study" of fifty types. A short list of modern (Vines) botanical terms with etymology and meaning is added. In his classification we are pleased to note that lichens are recognized as a distinct class. It may be that the "Studies" could be made use of by advanced students in our universities, provided it was thought advisable to take the time for making the records. Of what use these records might be afterwards is more than we can understand at present because there are already printed records of all the known plant species.

It is with regret that we make this adverse criticism, but we firmly believe that any mistaken tendency should be checked early. The mistaken idea of what constitutes plant study has already gained such a strong footing that we must put forth every effort to check its progress. Let us sincerely hope that pernicious "plant analyzing" may never be substituted for *Botany* in our higher institutions of learning. Let us hope that in the future the author will expend his time and talent on some work which will prove a real benefit to the advance of botanical science.

ALBERT SCHNEIDER.

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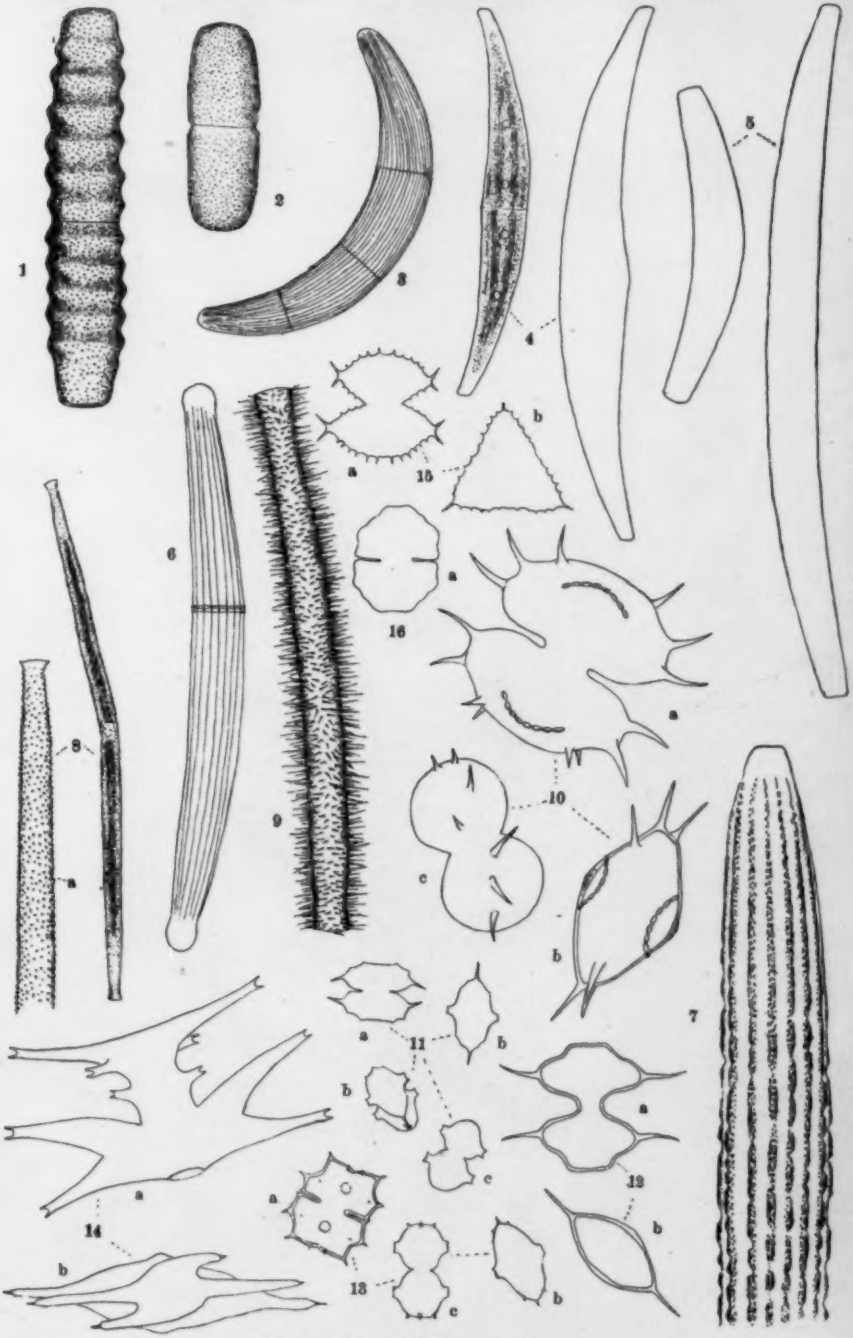
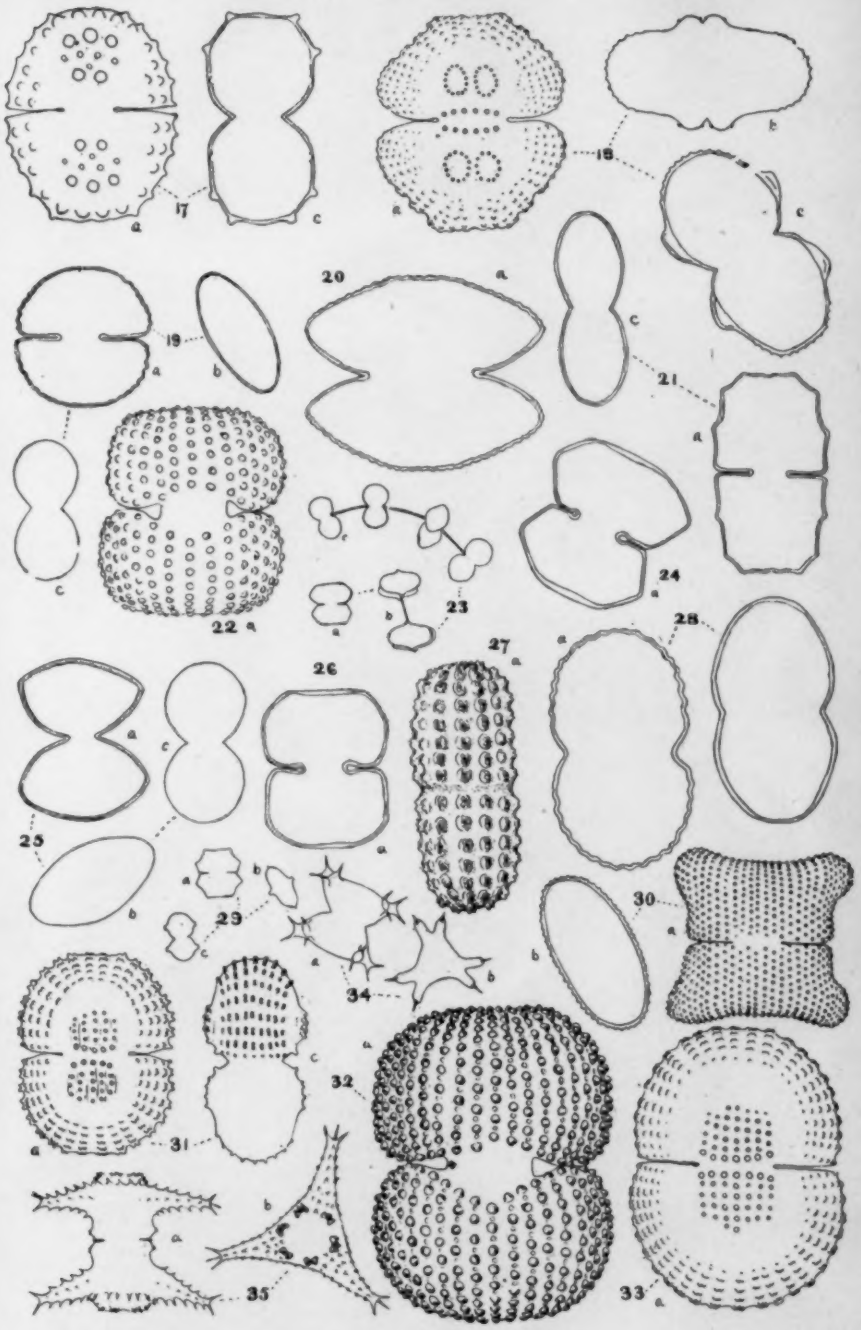


NEW AND RARE DESMIDS.



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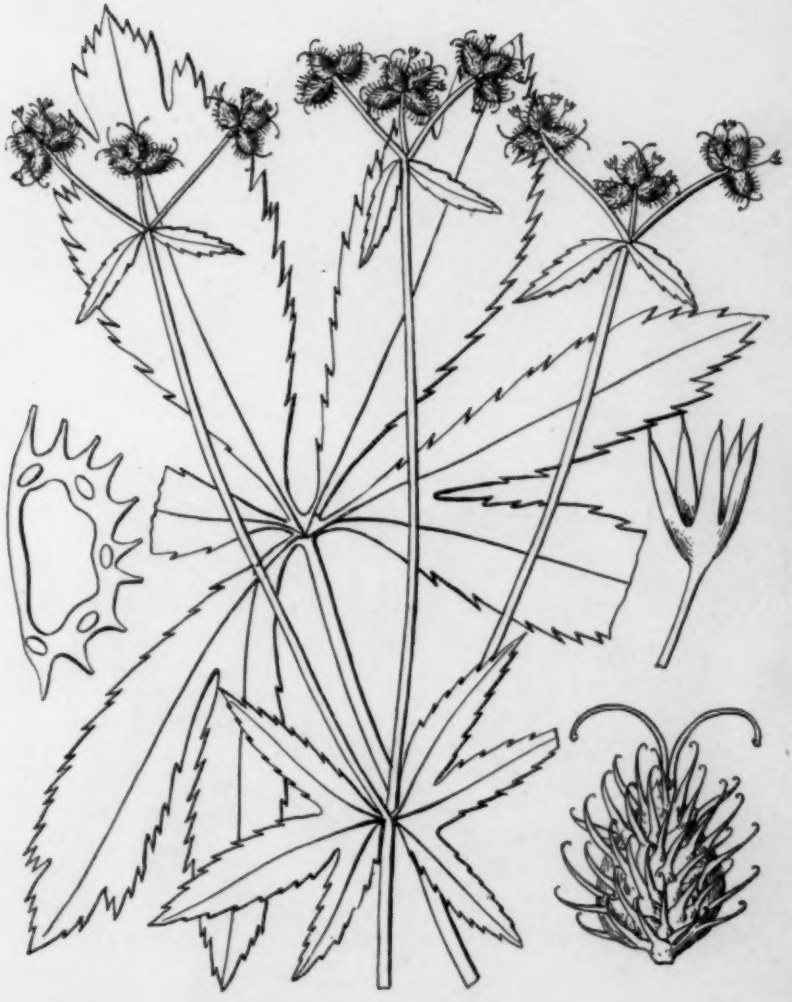
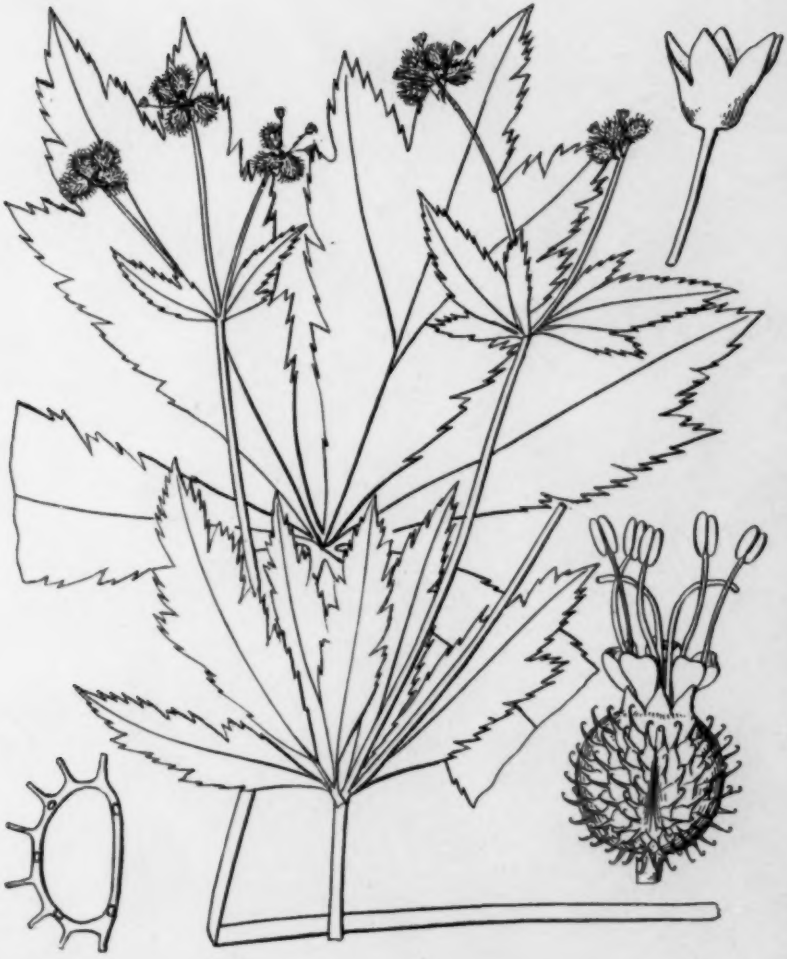
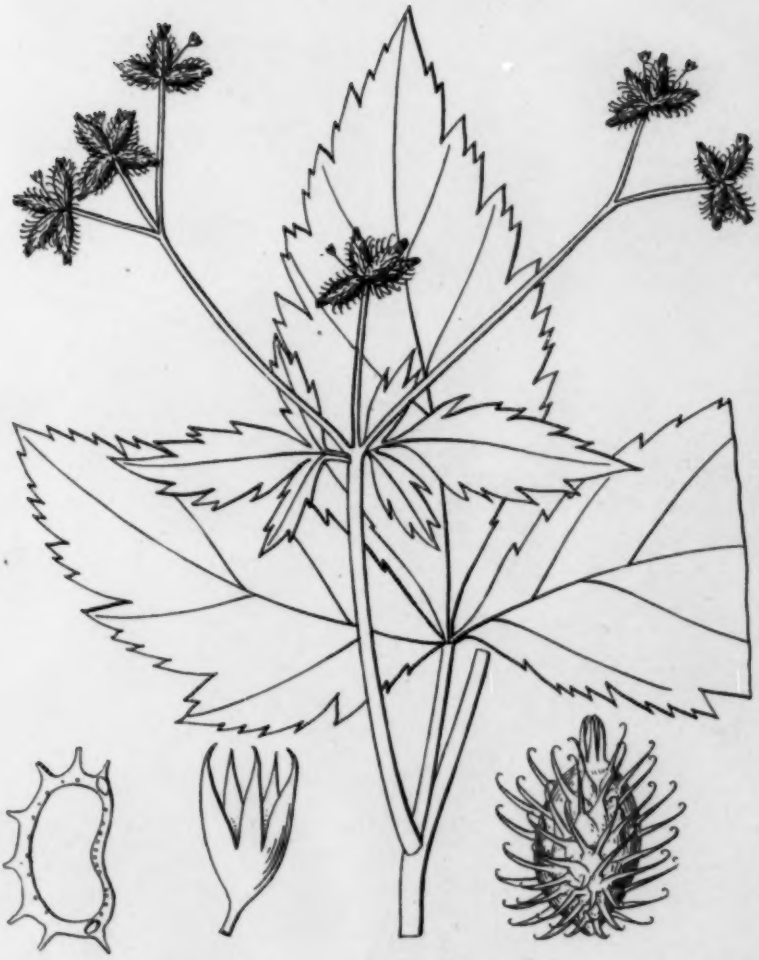


SANICULA MARYLANDICA L.

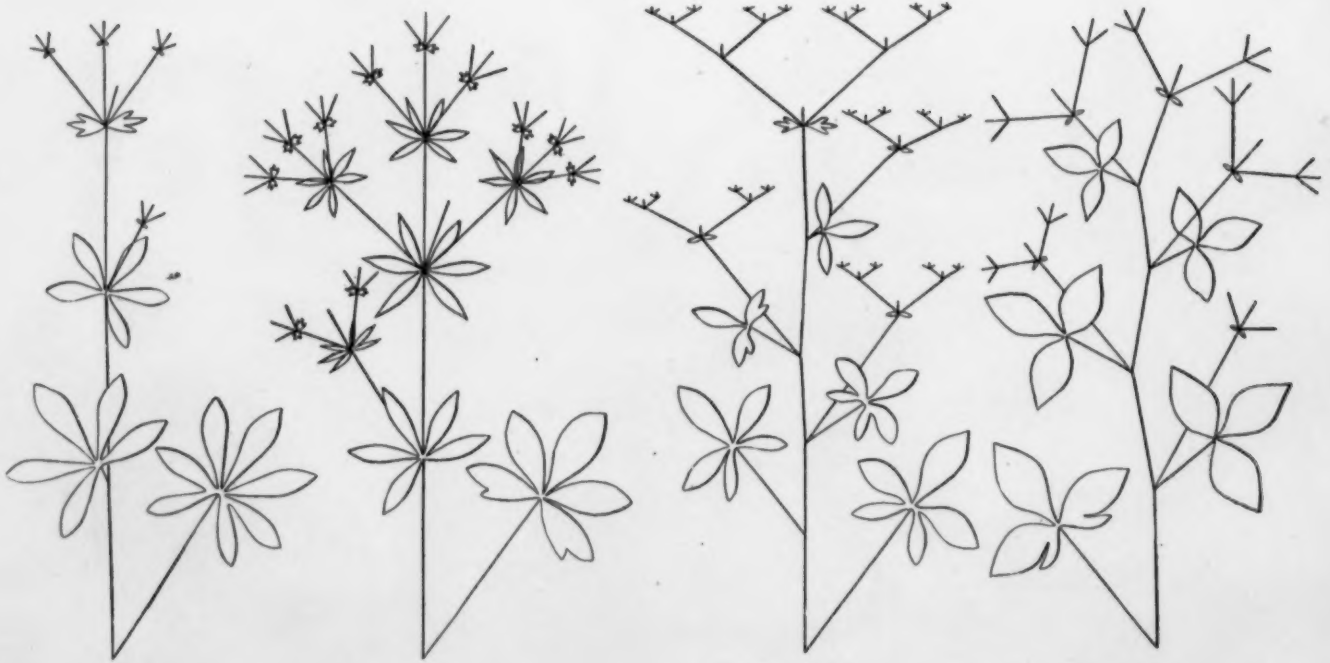


SANICULA GREGARIA BICKNELL.

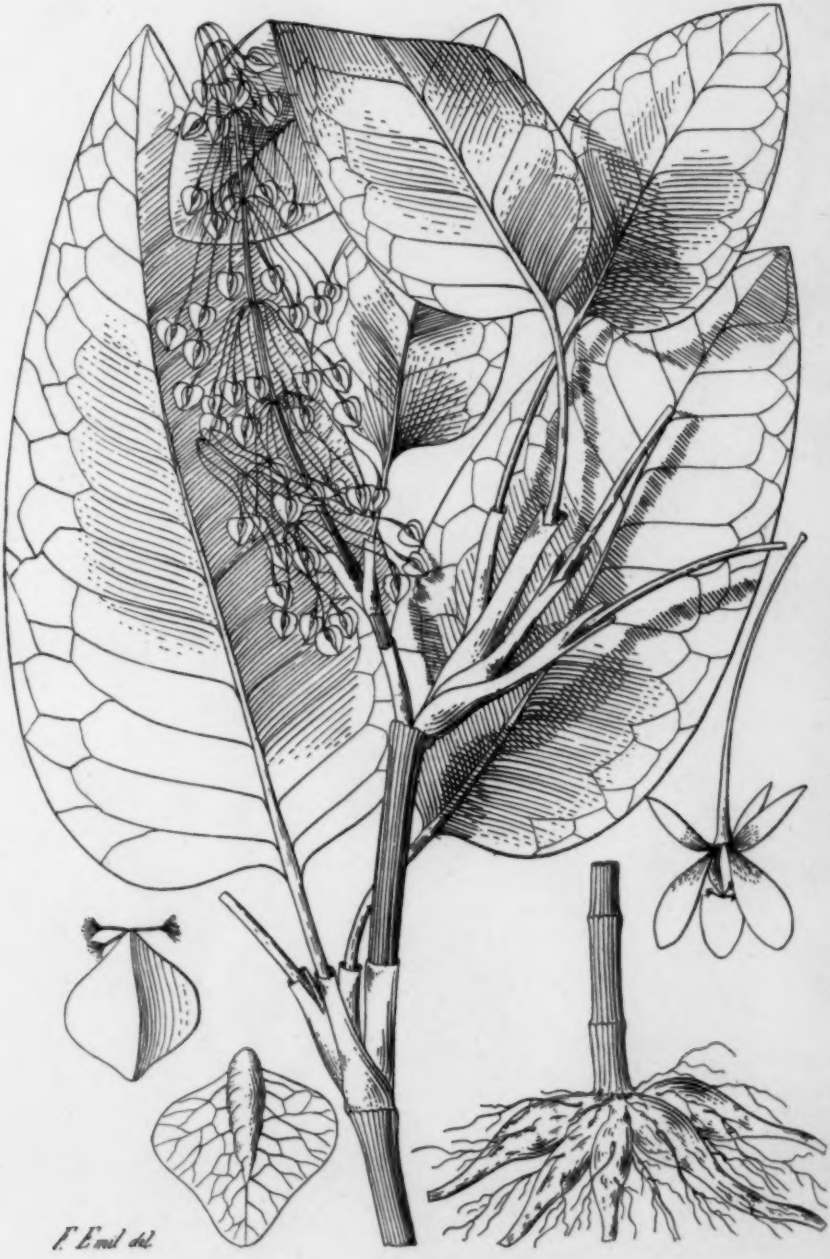
SANICULA CANADENSIS L.



SANICULA TRIFOLIATA BICKNELL.



BRANCHING OF EASTERN SANICULAS. (DIAGRAMMATIC.)



RUMEX FASCICULARIS SMALL.

Contributions from the Herbarium of Columbia College.

[The numbers omitted from this list are out of print.]

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No. 4. A List of Plants Collected by Miss Mary B. Croft at San Diego, Texas. By N. L. Britton and H. H. Rusby (1887), ... 25 cents.

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